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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/162,992

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EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/162,992	Applicant(s) SENOO ET AL.	
	Examiner Tracy Dove	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4, 6-9 and 17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4, 6-9 and 17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

This Office Action is in response to the communication filed on 6/4/07. Applicant's arguments have been considered, but are not persuasive. Claims 2-4, 6-9 and 17 are pending.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/4/07 has been entered.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2-4, 6-9 and 17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 17 recites "the non-aqueous solvent consists essentially of propylene carbonate in an amount of about 35 mol% and ethylene carbonate", which is not supported by the specification as filed. Examiner suggests "the non-aqueous solvent consists essentially of propylene carbonate in an amount of 35 mol% and ethylene carbonate" in accordance with pages 13 and 17 of the specification.

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2-4, 6 and 7 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites "wherein the gel electrolyte comprises a non-aqueous liquid electrolyte containing a non-aqueous solvent and an electrolyte salt", which lacks proper antecedent basis.

Claim 17 already recites "a non-aqueous solvent" and "an electrolyte salt".

Claims 3 and 4 recite "the high-molecular material having a nitrile group in its side chain is polyacrylonitrile", which lacks proper antecedent basis. It appears claims 3 and 4 should depend from claim 2.

Claim 6 recites "the non-aqueous solvent...contains at least one selected from the group of γ -butyrolactone...and dimethyl carbonate in addition to propylene carbonate and ethylene carbonate", which contains improper Markush group language and conflicts with claim 17 that recites "the non-aqueous consists essentially of propylene carbonate in an amount of about 35 mol% and ethylene carbonate", which is closed language.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2-4, 6-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over MacFadden, US 5,772,934 in view of Ozaki et al., US 5,522,127.

MacFadden teaches a lithium polymer battery comprising a cathode including a lithium transition metal compound (3:66-4:8), an anode preferably including finely ground graphite (4:9-15) and a solid polymer electrolyte (SPE) including a salt, a polymer and liquid. The electrolyte may include polyacrylonitrile (PAN) as the polymer, LiPF_6 as the salt and a mixture of ethylene carbonate and propylene carbonate in a ratio of 70:30 to 30:70 as the liquid (5:11-20). The anode and the cathode include a current collector (3:45-48). The anode has a thickness of at least 2-50 mils (4:36) and contains a binder such as butadiene or the like (4:16-25). The polymer is in an amount of 10-20 wt%, the liquid is in an amount of 65-75 wt% and the salt is in an amount of 5-12 wt% based on the SPE total weight (5:21-25). Example 2 has a specific teaching of 14 wt% LiPF_6 salt, 11 wt% PAN and 75 wt% of ethylene carbonate/propylene carbonate.

MacFadden does not specifically teach a graphite material obtained from a plurality of meso-carbon micro-beads having a specific surface area that ranges from 0.1-1.2 m^2/g .

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (col. 1, lines 8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (col. 3, lines 1-7). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m^2/g , preferably 2.5 to 5.0 m^2/g (5:50-58). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) to obtain a paste. A copper foil (current collector) of 0.02

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mm thickness was coated with the paste on both surfaces and then pressed to 0.20 mm thickness. The thickness of the coated active material layer is 0.18 mm [0.20 mm (coating + current collector) - 0.02 mm (current collector)]. A thickness of 0.18 mm is equivalent to 180 μm . The concentration of LiPF_6 with respect to the non-aqueous solvent is 1 mol/l (mol/cm^3) (4:55-58).

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of MacFadden. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (col. 3, lines 12-14). MacFadden teaches the negative electrode may be a carbonaceous material, preferably graphite, capable of intercalating lithium. Both Ozaki and MacFadden teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (see col. 4, lines 54-58 of Ozaki). One of skill would ~~be~~^{have been} motivated to use the graphite negative electrode of Ozaki as the graphite negative electrode of MacFadden because both materials are capable of intercalating lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

While MacFadden does not explicitly state the number average molecular weight of the PAN, this limitation is considered obvious in view of the teaching by MacFadden that PAN may be used as the polymer of the SPE.

*

Claims 2-4, 6-9 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Akashi, EP 0,724,305 A1, in view of Ozaki et al., US 5,522,127.

Akashi teaches a gel electrolyte and a lithium secondary cell using the gel electrolyte. The cell includes a positive electrode which may be a lithium/transition metal composite oxide, a negative electrode which may be a carbonaceous material such as graphite and the gel electrolyte. See page 5, lines 8-16. The non-aqueous solvent and the electrolyte salt used for the production of the gel electrolyte may be those generally used for the production of a lithium secondary cell. The solvent may be ethylene carbonate (EC), propylene carbonate (PC), γ -butyl lactone or mixtures thereof. The preferred salt is LiPF_6 . See page 4, lines 1-9. The gel electrolyte further includes a polymer having a side chain to which at least one nitrile group is bonded. The polymer is preferably polyacrylonitrile (PAN) and has a number-average molecular weight ranging from about 50,000 to about 500,000. See page 3, lines 45-59. A molar ratio of a monomer as a repeating unit of the PAN to the non-aqueous solvent is suitably in the range of 5:95 to 30:70 though it varies depending upon kinds of the non-aqueous solvent, the gelling agent and the electrolyte salt used. The lithium salt may be in a concentration of 0.4 to 2 M. See page 4, lines 13-17 and 31-32. Tables 1 and 2 teach a gel electrolyte including PAN, EC and PC where PC is 10-38 mol% of the gel electrolyte.

Akashi does not specifically teach the negative electrode of claim 15. Akashi teaches lithium secondary cells are well known to have a negative electrode made of a material such as lithium, a lithium alloy or a carbonaceous material capable of occluding lithium (page 2, lines 12-17). Akashi further teaches examples of suitable negative electrode activating ingredients may include metallic lithium, a lithium alloy and a carbonaceous material capable of occluding lithium, such as graphite (see page 5, lines 12-16).

However, Ozaki teaches a non-aqueous electrolyte secondary cell having a negative electrode of carbon material to which intercalation by charging and deintercalation by discharging of lithium is possible (col. 1, lines 8-12). The negative electrode is made from mesophase graphite particles. The mesophase graphite particles are produced from micro beads of mesophase carbon made from pitch (col. 3, lines 1-7). A favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m²/g, preferably 2.5 to 5.0 m²/g (5:50-58). The negative electrode was fabricated by mixing the mesophase graphite particles with styrene butadiene rubber (binder) and carboxymethyl cellulose to obtain a paste. A copper foil (current collector) of 0.02 mm thickness was coated with the paste on both surfaces and then pressed to 0.20 mm thickness. The thickness of the coated active material layer is 0.18 mm [0.20 mm (coating + current collector) - 0.02 mm (current collector)]. A thickness of 0.18 mm is equivalent to 180 μ m.

Therefore, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one of skill would have found it obvious to use the negative electrode of Ozaki for the negative electrode of Akashi. Ozaki teaches that the negative electrode including mesophase graphite leads to smooth intercalating of lithium at charging over a wide temperature range resulting in an increased cell capacity (col. 3, lines 12-14). Akashi teaches the negative electrode may be a carbonaceous material such as graphite that is capable of occluding lithium (intercalating). Both Ozaki and Akashi teach nonaqueous secondary cells having a negative electrode including graphite and a nonaqueous electrolyte comprising a lithium salt and a mixed solvent (see col. 4, lines 54-58 of Ozaki). One of skill would ^{have been} motivated to use the graphite negative electrode of Ozaki as the graphite negative

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electrode of Akashi because both materials are capable of occluding lithium and the graphite negative electrode of Ozaki leads to increased cell capacity.

Response to Arguments

Applicant's arguments filed 3/21/07 have been fully considered but they are not persuasive.

Applicant asserts Akashi does not teach or suggest a negative electrode comprising a current collector and a powder mixture including graphitized carbonized material obtained from a plurality of meso-carbon micro-beads. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Examiner admits Akashi does not teach the negative electrode of claim 17. However, Ozaki is applied in combination with Akashi to teach the negative electrode limitations of claim 17. Applicant has not addressed the Examiner's motivation for combining Akashi and Ozaki or provided convincing evidence that the two cited references are not combinable. Akashi teaches examples of suitable negative electrode activating ingredients may include metallic lithium, a lithium alloy and a carbonaceous material capable of occluding lithium, such as graphite (see page 5, lines 12-16).

Applicant argues Ozaki does not teach a specific surface area that ranges from 0.1-1.2 m²/g, as required by claim 17. However, Ozaki teaches a favorable range of the specific surface area of the mesophase graphite particles is 1.0 to 8.0 m²/g, preferably 2.5 to 5.0 m²/g (5:50-58). Ozaki is not limited to any preferred embodiment. The claimed endpoint of 1.2 m²/g falls within

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the prior art range for specific surface area. Furthermore, the disclosed endpoint $1.0 \text{ m}^2/\text{g}$ of Ozaki falls within the specific surface area range of claim 17. Therefore, Ozaki does disclose a specific surface area of $0.1\text{-}1.2 \text{ m}^2/\text{g}$ as recited by claim 17.

Applicant repeats arguments that have been determined by the Board of Patent Appeals to be non-persuasive. See Board decision of 1/19/06 affirming the Examiner and the Examiner's Answer of 3/9/04. Specifically, Akashi, not Ozaki, discloses the use of propylene carbonate as an organic solvent, and Applicant has not demonstrated why one of ordinary skill in the art would have been dissuaded from using the carbonaceous material of Ozaki for the negative electrode of Akashi. Nor has Applicant established that the use of propylene carbonate as the only solvent in Applicant's secondary cell would not experience the disadvantageous decomposition of propylene carbonate with the evolution of gas taught by Ozaki.

Note evidence of unexpected results must distinguish the claimed invention over the prior art of record. Akashi teaches the claimed percentage of propylene carbonate contained in the electrolyte solvent and Ozaki teaches the claimed negative electrode material. Applicant has not addressed the Examiner's motivation for combining Akashi and Ozaki.

Conclusion


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is 571-272-1285. The examiner can normally be reached on Monday-Thursday (9:00-7:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

August 10, 2007



TRACY DOVE
PRIMARY EXAMINER